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Hu

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(54) **RATCHET WRENCH WITH TOOTH BREAKAGE RESISTANCE**

(71) Applicant: **Bobby Hu**, Taichung (TW)

(72) Inventor: **Bobby Hu**, Taichung (TW)

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B25B 13/46 (2006.01)
B25B 23/00 (2006.01)

(52) **U.S. Cl.**
CPC ***B25B 13/465*** (2013.01); ***B25B 23/0035*** (2013.01)

(58) **Field of Classification Search**
CPC B25B 13/465
USPC 81/62
See application file for complete search history.

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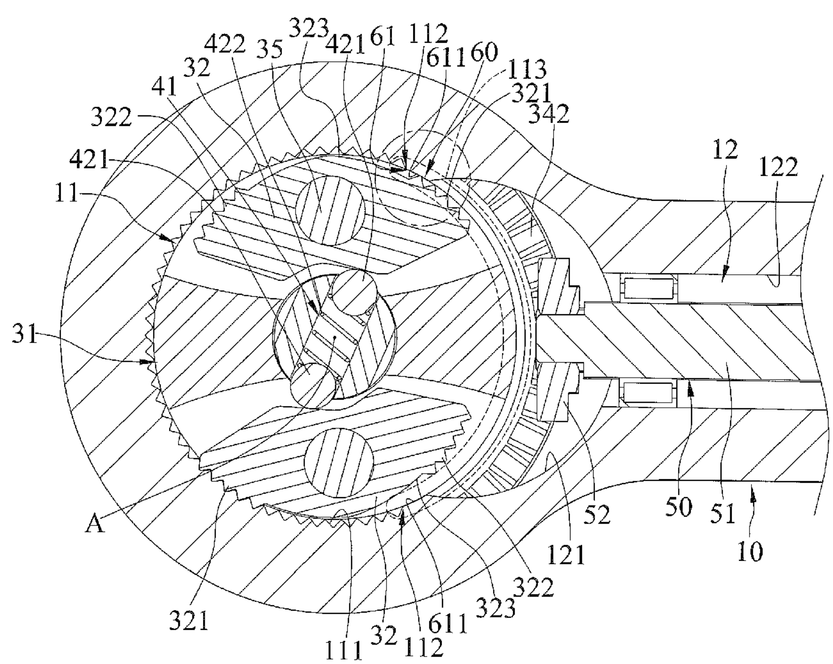
Primary Examiner — Hadi Shakeri
(74) *Attorney, Agent, or Firm* — Alan D. Kamrath; Kamrath IP Lawfirm, P.A.

(57) **ABSTRACT**

A ratchet wrench with tooth breakage resistance includes a body having a driving hole and a transmission hole intersecting with the driving hole. An inner periphery of the driving hole includes two adjoining portions on opposite sides of the transmission hole. An arcuate portion extends between the two adjoining portions. A tooth breakage preventing device is mounted in the arcuate portion and is configured to be in contact with one of first and second outer toothed sections of either of two first pawls to prevent tooth breakage between a toothed portion of the driving hole and the one of the first and second outer toothed sections of either of the two first pawls when the body is rotated to provide a ratcheting function for driving the fastener.

7 Claims, 11 Drawing Sheets



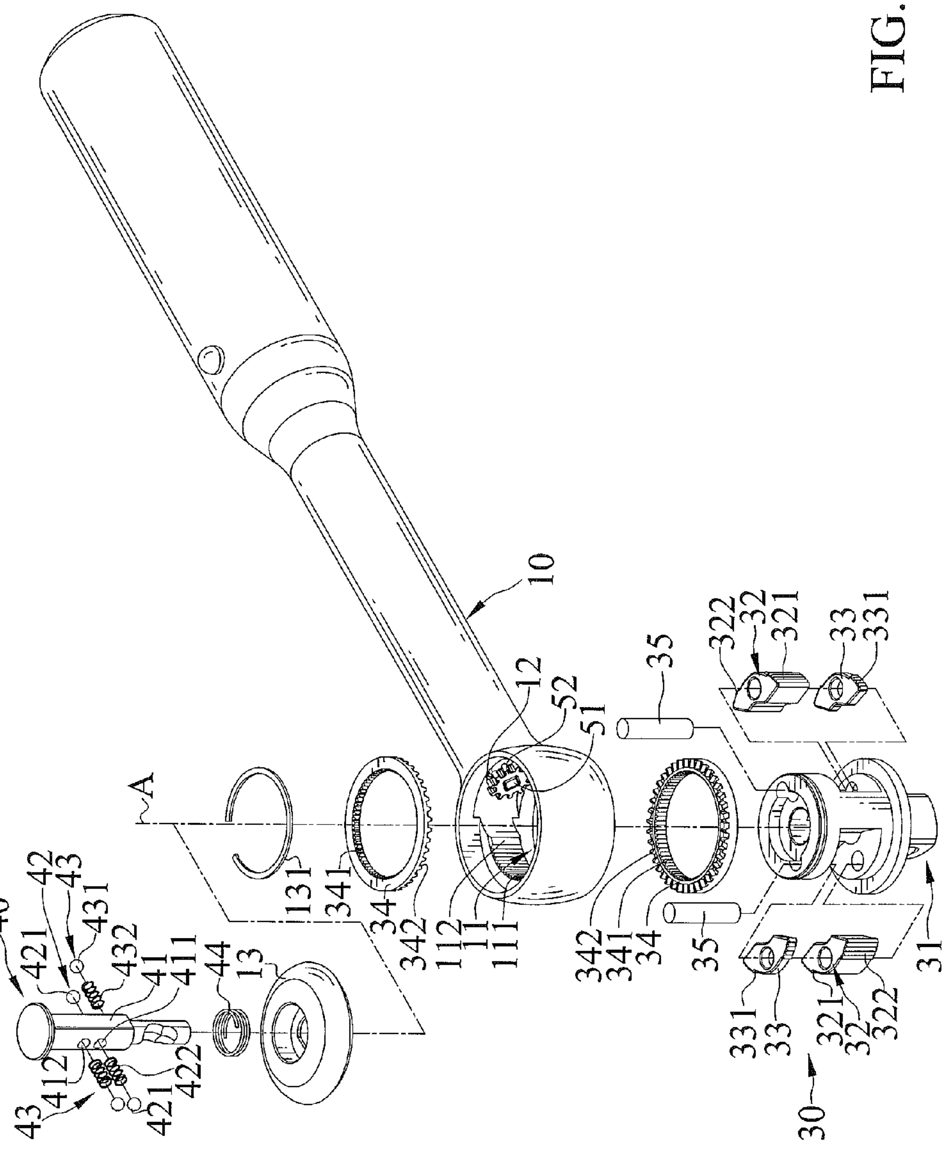

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FIG. 1

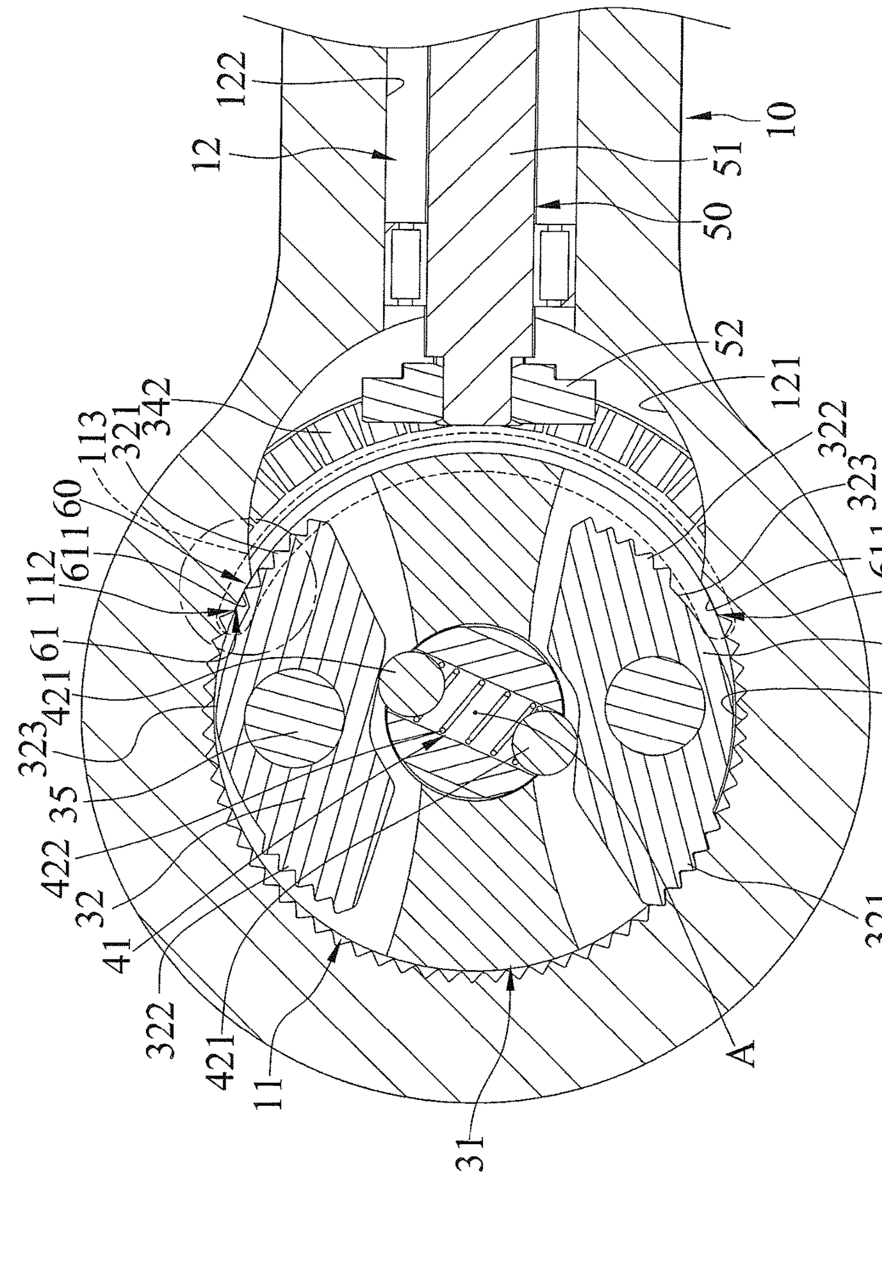
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FIG. 2

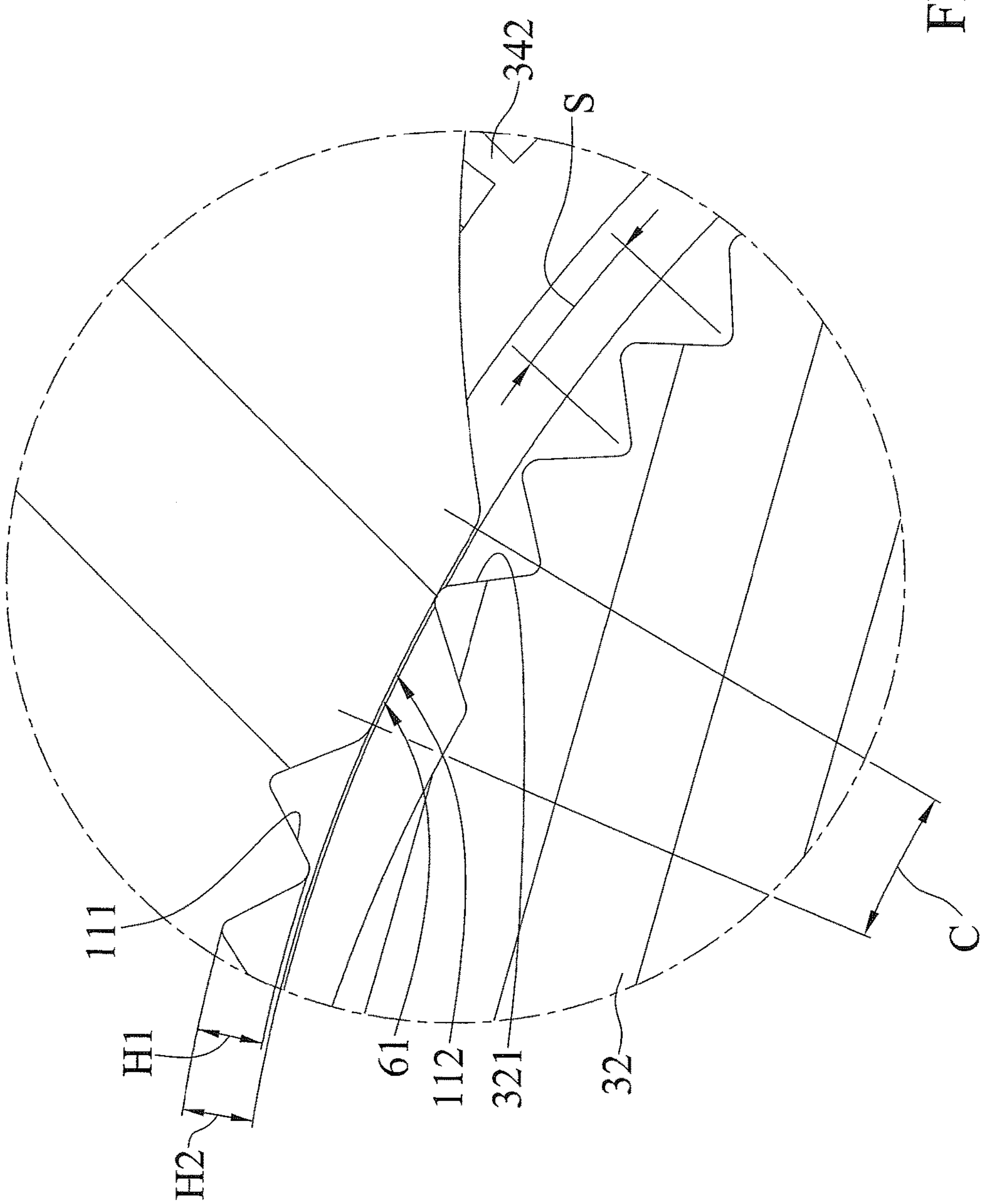

FIG. 3

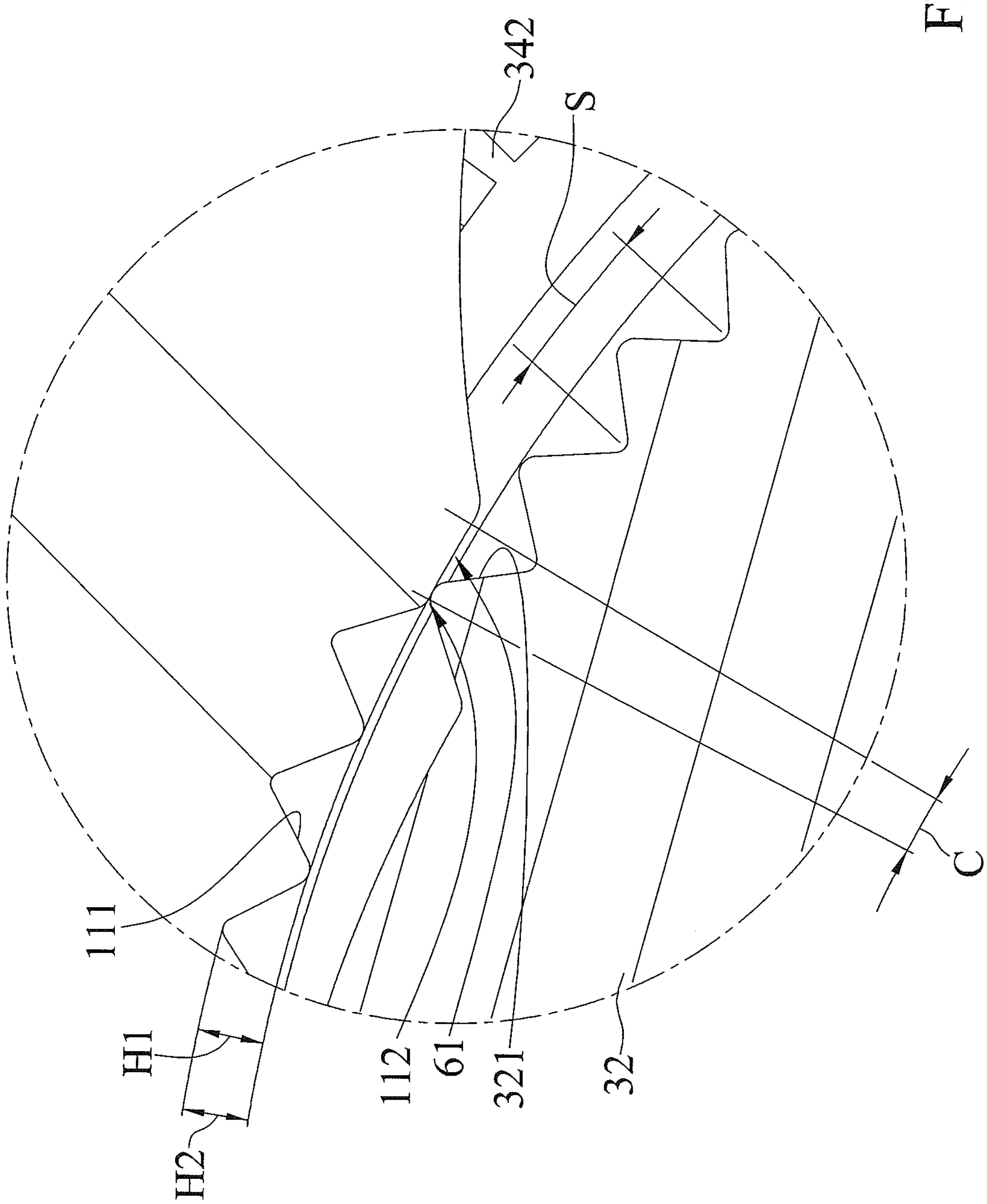

FIG. 4

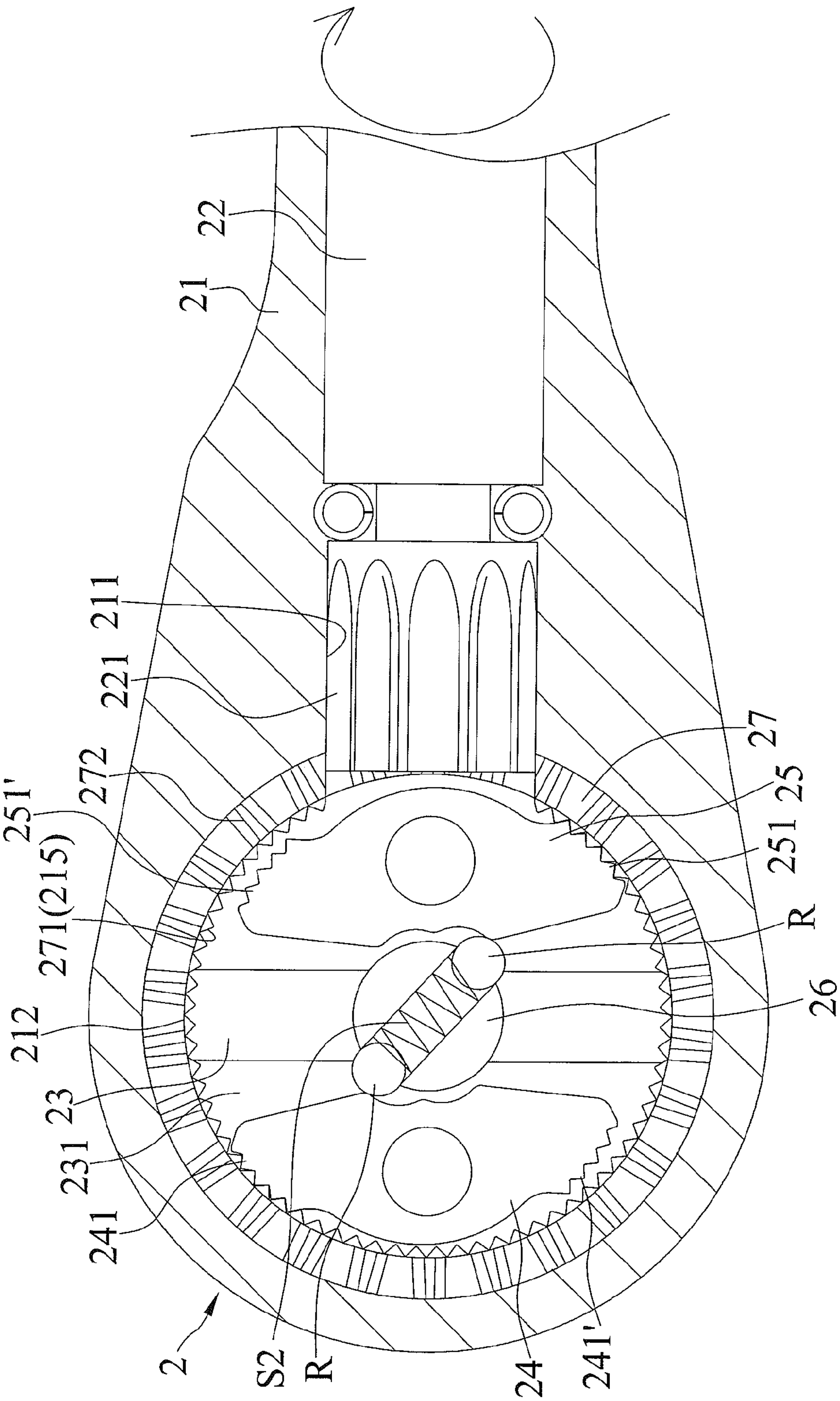

FIG. 5
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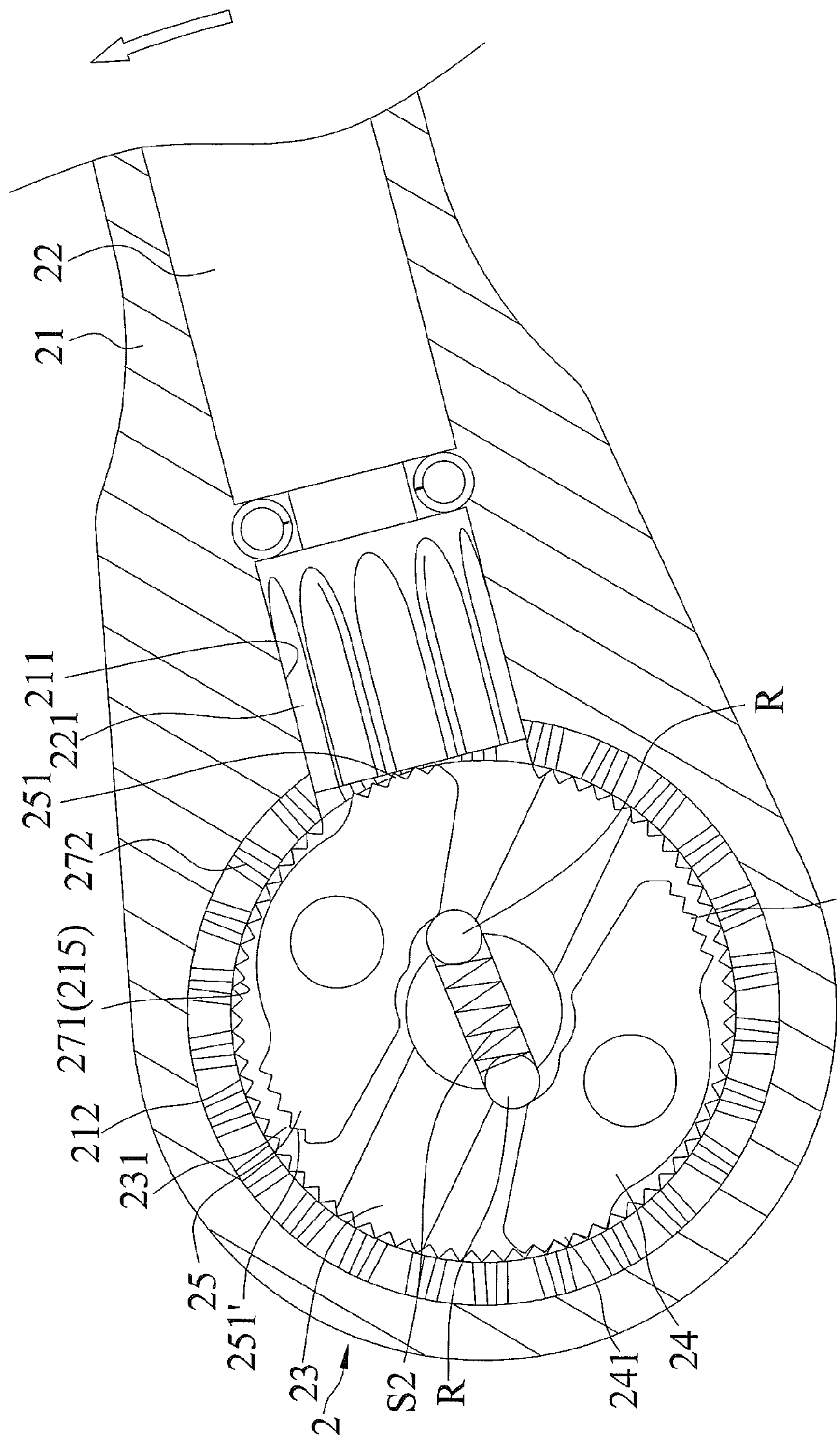

FIG. 6
PRIOR ART

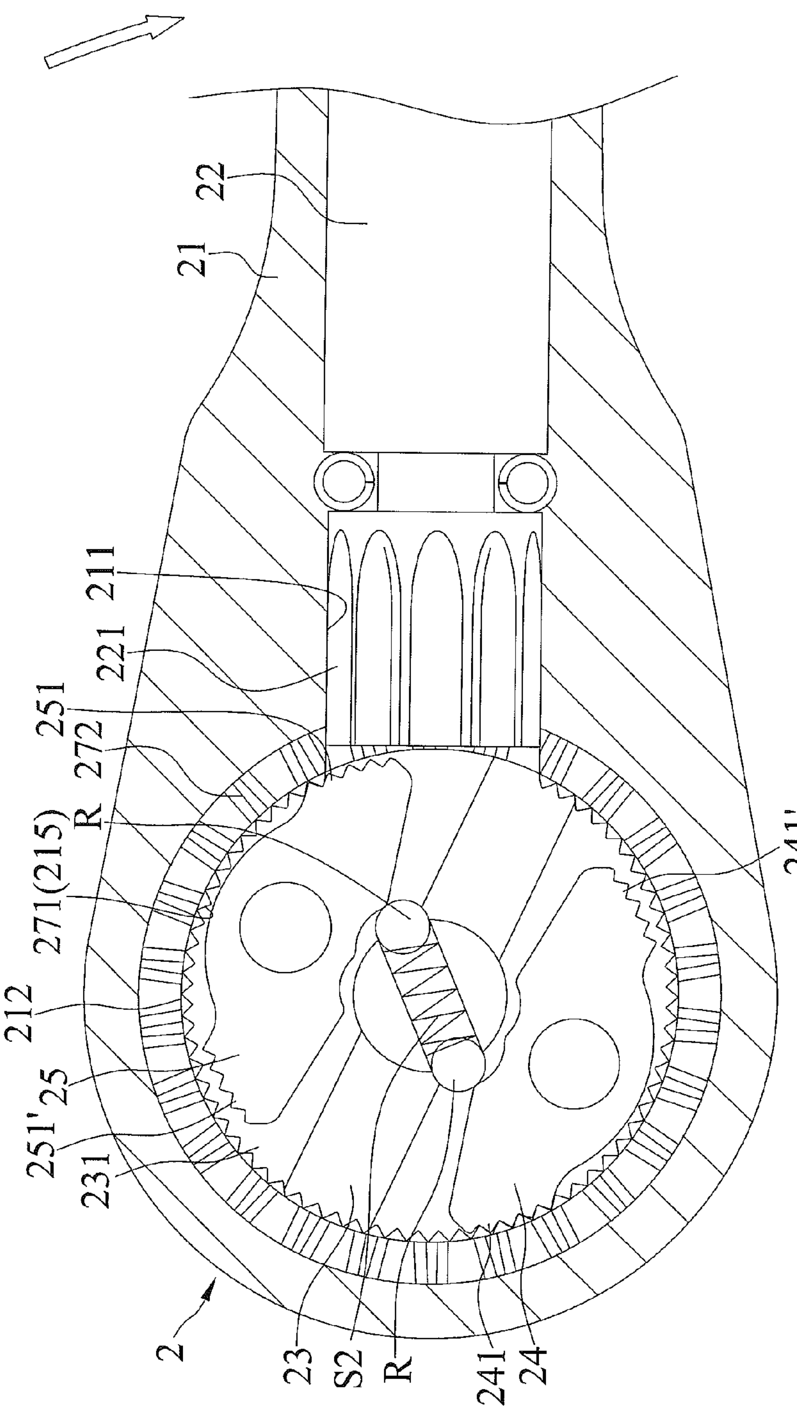

FIG. 7
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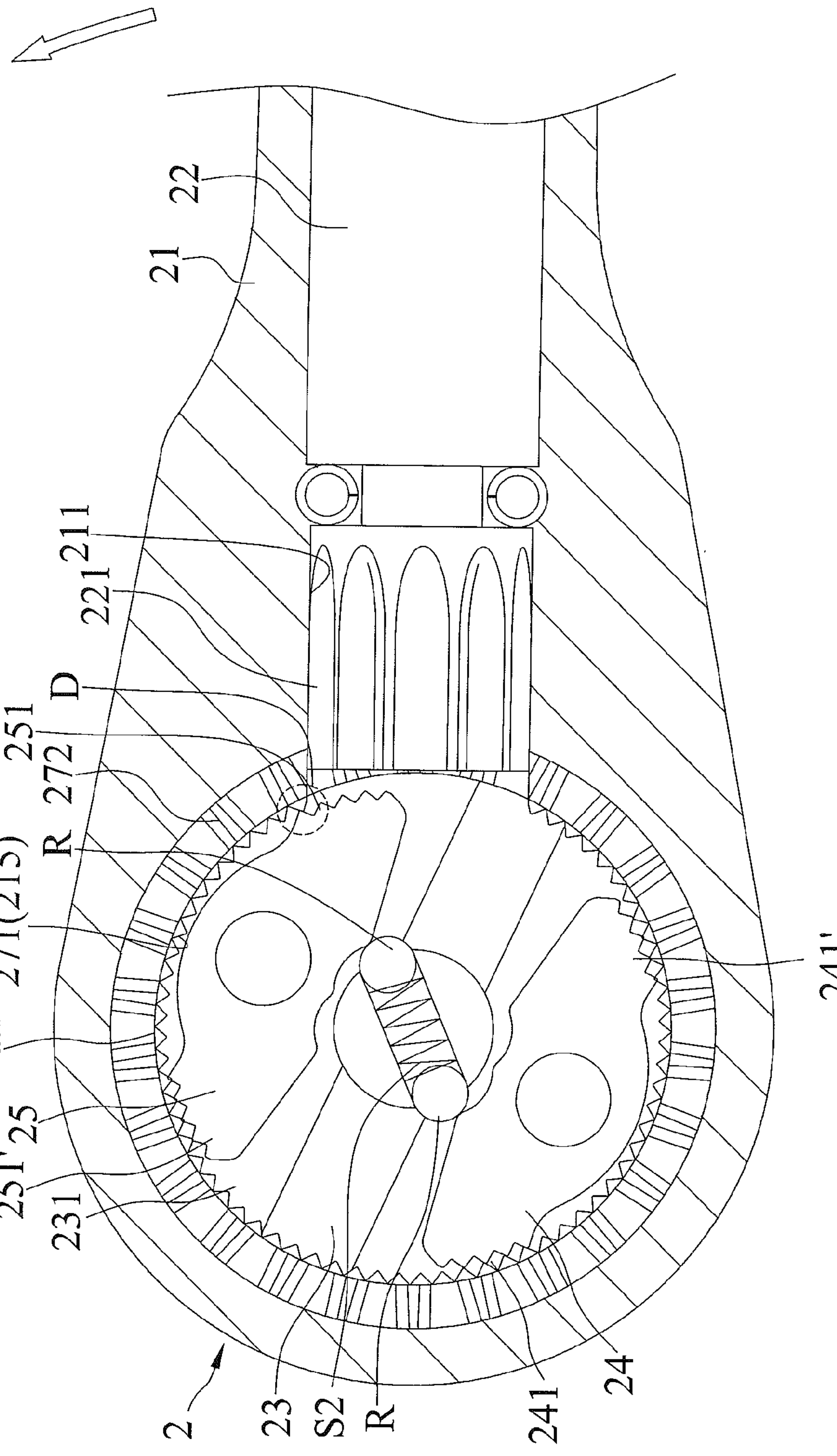

FIG. 8
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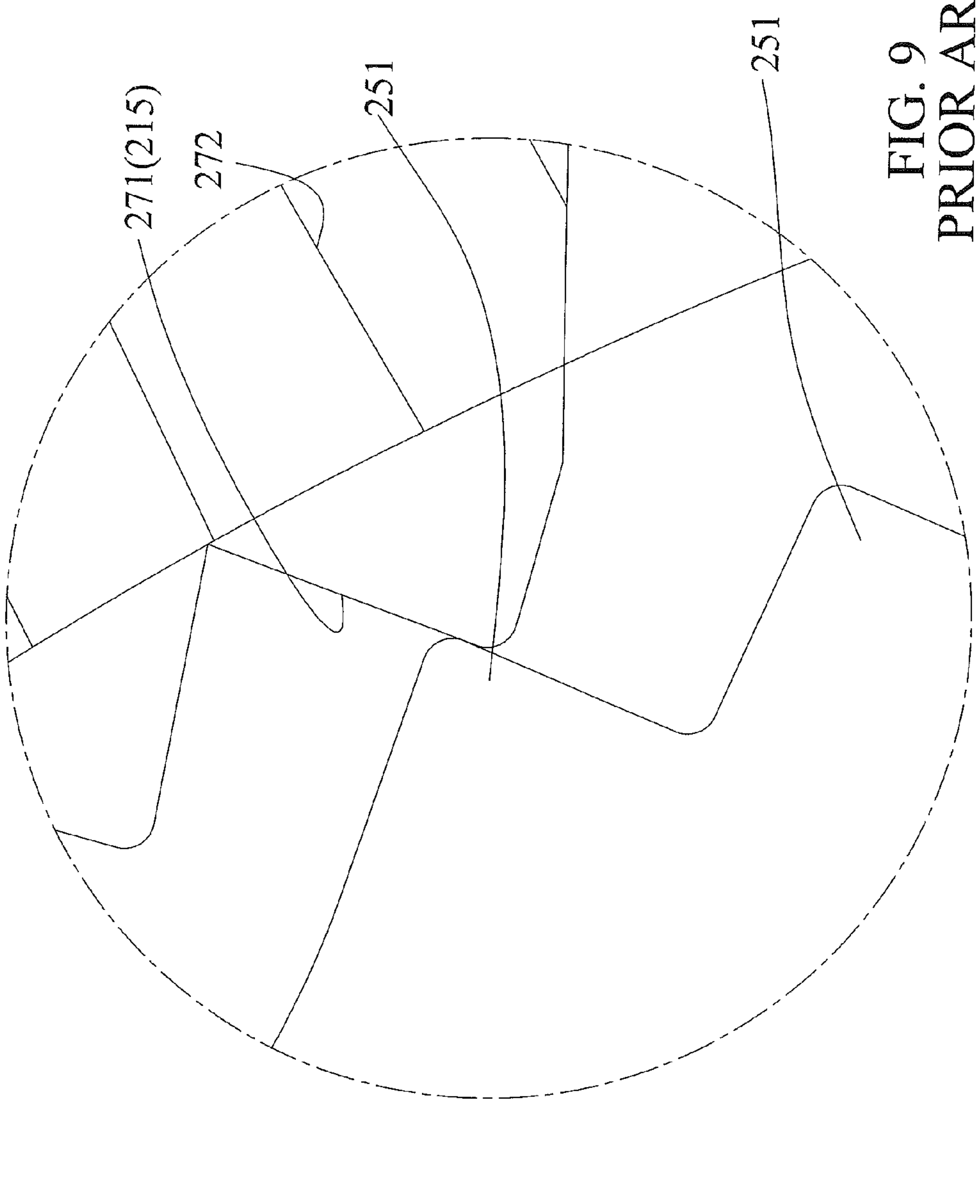

FIG. 9
PRIOR ART

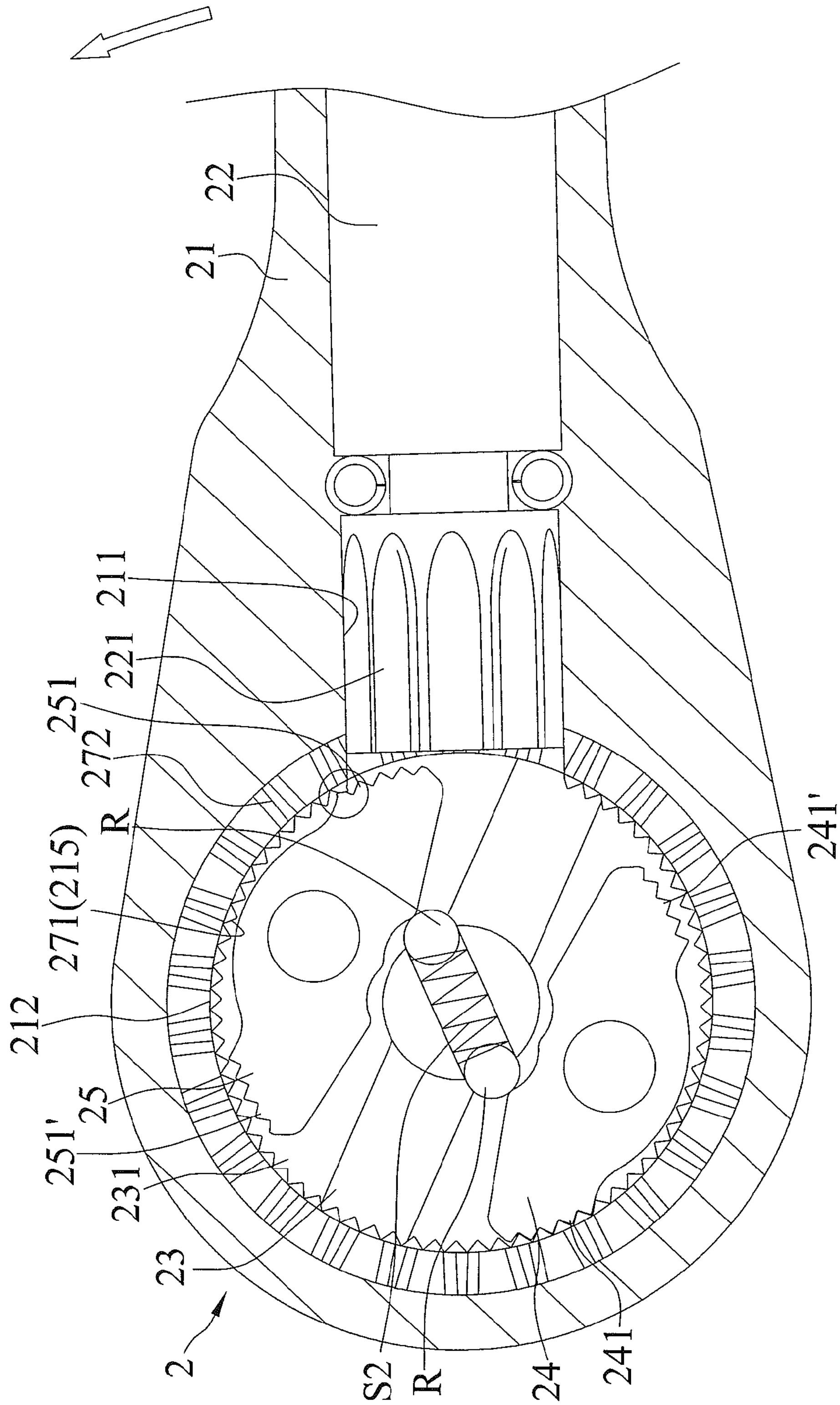

FIG. 10
PRIOR ART

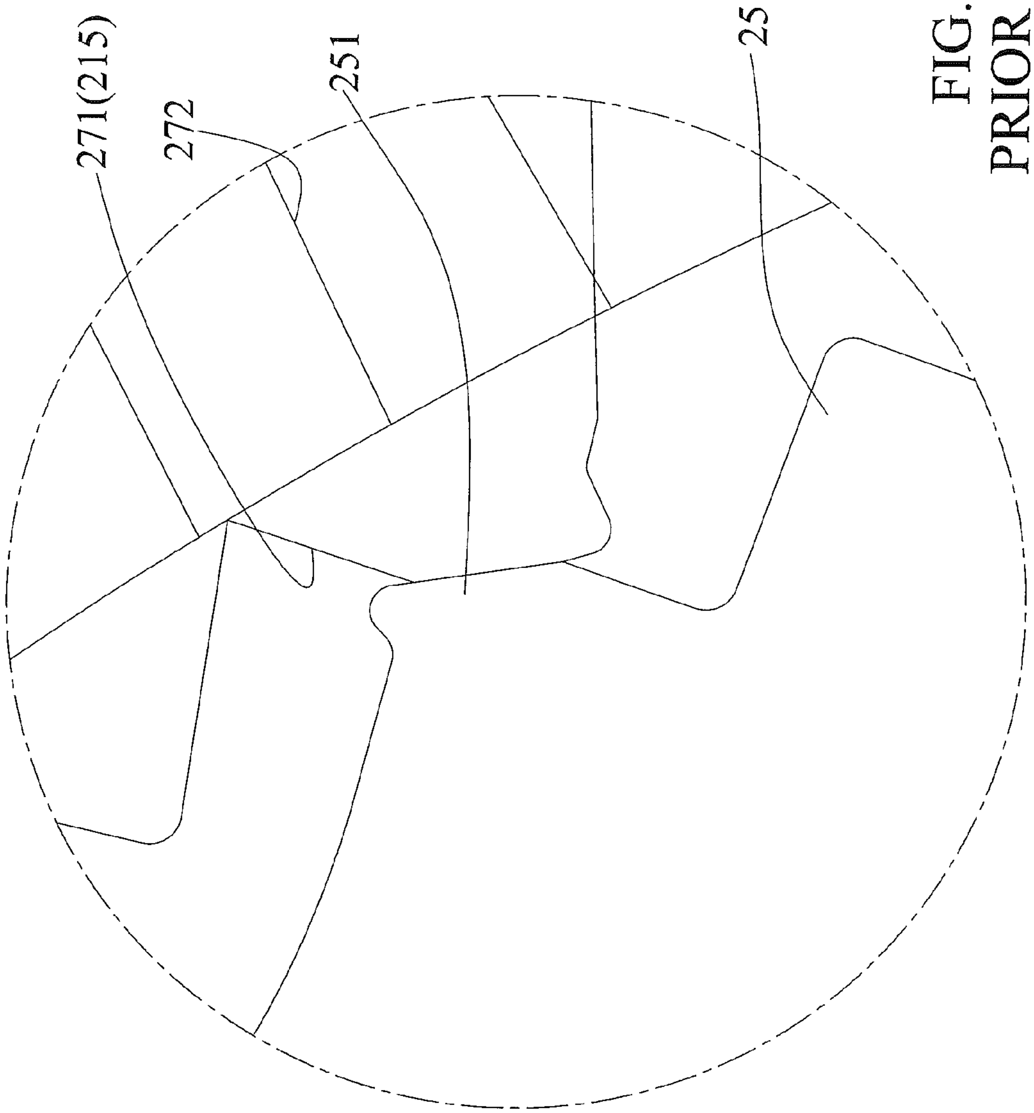

FIG. 11
PRIOR ART

RATCHET WRENCH WITH TOOTH BREAKAGE RESISTANCE

BACKGROUND OF THE INVENTION

The present invention relates to a ratchet wrench and, more particularly, to a ratchet wrench with a tooth breakage resistance.

FIG. **5** of the drawings is a schematic diagram corresponding to FIG. 8 of U.S. Pat. No. 6,457,386. U.S. Pat. No. 6,457,386 discloses a ratchet wrench **2** including a driving member **23** having a chamber **231** in which a pair of first pawls **24** and a pair of second pawls **25** are mounted. A first annular gear **27** encloses one of the first pawls **24** and one of the second pawls **25**. A second annular gear **27** encloses the other first pawl **24** and the other second pawl **25**. A main body **21** of the ratchet wrench **2** includes a groove **212** for receiving the drive member **23** and a through-hole **211** communicating with the groove **212**. Each of the first and second annular gears **27** includes a plurality of inner periphery teeth **271** and a plurality one-sided teeth **272**. An inner periphery defining the groove **212** includes a plurality of inner teeth **215**. First and second outer teeth **241**, **241'** on the first pawls **24** and first and second outer teeth **251**, **251'** on the second pawls **25** selectively engage with the inner teeth **215** of the groove **212** and the inner periphery teeth **271** of the first and second annular gears **27**, prohibiting movement in a direction. The one-sided teeth **272** of the first and second annular gears **27** engage with a bevel gear **221** on an end of a drive shaft **22** to provide transmission in the reverse direction. FIG. 7 of U.S. Pat. No. 6,457,386 shows the thickness of the second pawls **25** along a rotating axis of the drive member **23** is smaller than a diameter of the through-hole **211**.

When the control member **26** is pivoted, the second pawls **25** pivot to permit the first outer teeth **251** or the second outer teeth **251'** of the second pawls **25** to engage with the inner periphery teeth **271** of the first and second annular gears **27**, thereby adjusting the rotating direction of the drive member **23**. In the state shown in FIG. **5**, the first outer teeth **241** of the first pawls **24** engage with the inner teeth **215** of the groove **212**, and the first outer teeth **251** of the second pawls **25** engage with the inner periphery teeth **271** of the first and second annular gears **27**. Since the one-sided teeth **272** of the first and second annular gears **27** engage with the bevel gear **221** on the drive shaft **22** to permit transmission in the reverse direction, when one of the first and second annular gears **27** rotate idly, the other of the first and second annular gears **27** drives the drive member **23** to rotate. During rotation in the reverse direction, both first and second annular gears **27** rotate idly. Thus, the drive member **23** can be driven to rotate relative to the groove **212** in either direction. Thus, a user can firstly rotate the drive shaft **22** to actuate the first and second annular gears **27** via the bevel gear **221**, thereby rapidly driving the drive member **23** to tighten a fastener (not shown) to a certain extent, but not achieving the completely tightened state or a desired tightened state demanded by the user.

FIG. **6** is a diagram showing a continuing operation on the ratchet wrench in the state shown in FIG. **5**. Specifically, the user operates the main body **21** to rotate the drive member **23** in the counterclockwise direction. Due to engagement between the first outer teeth **241** of the first pawls **24** and the inner teeth **215** of the groove **212** and due to the engagement between the first outer teeth **251** of the second pawls **25** and the inner periphery teeth **271** of the first and second annular gears **27** (which permits movement in a single direction), the drive member **23** rotates relative to the groove **212** and drives the fastener to the desired tightness demanded by the user. Since the thickness of the first and second pawls **25** is smaller than the diameter of the through-hole **211**, one of the second pawls **25** falls into the through-hole **211** of the main body **21** and comes into contact with the end of the drive shaft **22** during the rotation of the drive member **23** relative to the groove **212**.

FIG. **7** is a diagram showing a continuing operation on the ratchet wrench in the state shown in FIG. **6**. Specifically, the user operates the main body **21** to rotate the drive member **23** in the clockwise direction. The first and second pawls **24** and **25** pivot relative to the drive member **23**, such that the first outer teeth **241** of the first pawls **24** disengage from the inner teeth **215** of the groove **212** and such that the first outer teeth **251** of the second pawls **25** disengage from the inner periphery teeth **271** of the first and second annular gears **27**. At this time, the groove **212** rotates idly relative to the drive member **23**. Namely, the drive member **23** is not driven and, thus, provides a ratcheting function. After the user stops rotating the main body **21**, the first outer teeth **241** of the first pawls **24** and the first outer teeth **251** of the second pawls **25** respectively reengage with the inner teeth **215** of the groove **212** and the inner periphery teeth **271** of the first and second annular gears **27** under the action of the compression springs S2 and the balls R.

When the user rapidly and repeatedly proceed with the driving rotation and the idle rotation, the drive member **23** rotates relative to the groove **212** before the drive member **23** reaches a position shown in FIG. **8**. FIGS. **8** and **9** show that the first pawls **24** are pressed by the balls R biased by the compression springs S**2**. Before complete engagement between the inner teeth **215** of the groove **212** adjacent to the through-hole **211** (see circled portion D), only one of the first outer teeth **251** of the second pawl **25** engages with one of the inner teeth **215** in the groove **212** adjacent to the through-hole **211**. Furthermore, the single-tooth engagement is not complete or is called a non-complete engagement. Namely, the contact area between these two teeth **251** and **215** shown in FIG. **9** is relatively small.

With reference to FIGS. **10** and **11**, if the fastener coupled with the drive member **23** requires a large torque to reach the desired tightness demanded by the user, when the user applies a force while the first outer teeth **251** of the second pawl **25** and the inner teeth **215** in the groove **212** adjacent to the through-hole **211** have a small contact area and the non-complete engagement therebetween, a section of the one of the inner teeth **215** of groove **212** facing the through-hole **211** does not have any mechanism to withstand the force acting on the one of the outer teeth **251** of the second pawl **25**. As a result, the one of the inner teeth **251** of the second pawl **25**, the one of the inner teeth of the groove **212** cannot withstand the torque, leading to tooth breakage, particularly the one of the inner teeth **215** of the groove **212** adjacent to the through-hole **211**.

Conclusions as a result, the user applies a force to rotate the main body **21**, while the first outer teeth **251** of the second pawl **25** and the inner teeth **215** in the groove **212** adjacent to the through-hole **211** have a small contact area and the non-complete engagement therebetween. When only one of the first outer teeth **251** of the second pawl **25** non-completely engages with one of the inner teeth **215** in the groove **212** adjacent to the through-hole **211**, the section of the one of the inner teeth **215** of the groove **212** facing the through-hole **211** does not have any mechanism to withstand the force acting on the one of the outer teeth **251** of the second pawl **25**, leading to tooth breakage.

Thus, a need exists for a novel ratchet wrench with tooth breakage resistance.

BRIEF SUMMARY OF THE INVENTION

A ratchet wrench according to the present invention includes a body having a driving hole and a transmission hole intersecting with the driving hole. The driving hole includes an inner periphery having a toothed portion with a plurality of teeth. The inner periphery of the driving hole includes two adjoining portions on opposite sides of the transmission hole in a circumferential direction of the driving hole. An arcuate portion extends between the two adjoining portions and extends across the transmission hole in the circumferential direction of the driving hole.

The ratchet wrench further includes a driving device rotatably received in the driving hole and adapted to drive a fastener. The driving device includes a driving member and two first pawls pivotably mounted to the driving member. Each of the first pawls includes first and second outer toothed sections. Each of the first and second outer toothed sections has a plurality of teeth. The first and second outer toothed sections of at least one of the first pawls are selectively engaged with the toothed portion of the driving hole. A transmission device is rotatably mounted in the transmission hole. The transmission device is configured to drive the driving member to rotate relative to the driving hole about a rotating axis. A tooth breakage preventing device is mounted in the arcuate portion. The tooth breakage preventing device is configured to be in contact with one of the first and second outer toothed sections of either of the two first pawls to prevent tooth breakage between the toothed portion of the driving hole and the one of the first and second outer toothed sections of either of the two first pawls when the body is rotated to provide a ratcheting function for driving the fastener.

The tooth breakage preventing device can include at least one contact portion configured to be selectively in contact with one of the first and second outer toothed sections of either of the two first pawls. The at least one contact portion includes a height extending from a circumference of a root circle of the toothed portion towards the driving hole in a radial direction of the root circle. Each of the plurality of teeth of the toothed portion of the driving hole has a tooth height not larger than the height of the at least one contact portion.

In an embodiment, the height of the at least one contact portion is larger than the tooth height of the toothed portion of the driving hole, and the at least one contact portion is a protrusion extending from the circumference of the root circle of the toothed portion towards the driving hole in the radial direction of the root circle.

In another embodiment, the height of the at least one contact portion is equal to the tooth height of the toothed portion of the driving hole, and the at least one contact portion and the two adjoining portions are located in the circumferential direction of the driving hole.

In an embodiment, the driving hole is defined in an end of the body and extends along the rotating axis. The at least one contact portion of the tooth breakage preventing device has an arc length in the circumferential direction of the driving hole centered on the rotating axis. Each of the two first pawls includes an arcuate section between the first and second outer toothed sections. Each of the first and second outer toothed sections includes a plurality of teeth. Each of the plurality of teeth of each of the first and second outer toothed sections has a tooth thickness. A ratio of the arc length to the tooth thickness is not smaller than 0.5.

In an embodiment, the at least one contact portion of the tooth breakage preventing device includes two contact portions integrally formed with the two adjoining portions, respectively. The two contact portions have two arcuate faces, respectively. The two arcuate faces are selectively in contact with one of the first and second outer toothed sections of either of the two first pawls. The two adjoining portions are located in an intersection between the driving hole and the transmission hole and are symmetric to each other. The two arcuate faces of the two contact portions are symmetric to each other.

The present invention will become clearer in light of the following detailed description of illustrative embodiments of this invention described in connection with the drawings.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is an exploded, perspective view of a ratchet wrench with tooth breakage resistance of a first embodiment according to the present invention.

FIG. **2** is a partial, cross sectional view of the ratchet wrench of FIG. **1**.

FIG. **3** is an enlarged view of a circled portion of FIG. **2**.

FIG. **4** is a view similar to FIG. **3**, illustrating a ratchet wrench with tooth breakage resistance of a second embodiment according to the present invention.

FIG. **5** is a diagram of a conventional ratchet wrench, with two first outer teeth of two first pawls engaged with inner teeth of a groove of a main body of the conventional ratchet wrench.

FIG. **6** is a diagram showing a continuing operation on the ratchet wrench in the state shown in FIG. **5**, with the main body rotated in the counterclockwise direction and with one of the first pawls fallen into a through-hole of the main body and in contact with an end of a drive shaft.

FIG. **7** is a diagram showing a continuing operation on the ratchet wrench in the state shown in FIG. **6**, with the main body rotated in the clockwise direction, with the first pawls and the inner teeth of the groove providing a ratcheting function, and with the drive member rotated idly.

FIG. **8** is a diagram illustrating a state immediately before FIG. **7**, with only one of the first outer teeth of a second pawl engaged with one of the inner teeth in the groove adjacent to a through-hole of the main body by a relatively small contact area.

FIG. **9** is an enlarged view of a circled portion of FIG. **8**.

FIG. **10** is a diagram showing a continuing operation on the ratchet wrench in the state shown in FIG. **9**, illustrating tooth breakage due to the main body rotated while the first outer teeth of the second pawl and the inner teeth in the groove adjacent to the through-hole in a non-complete engagement.

FIG. **11** is an enlarged view of a circled portion of FIG. **10**.

DETAILED DESCRIPTION OF THE INVENTION

With reference to FIGS. **1-3**, a ratchet wrench with tooth breakage resistance of a first embodiment according to the present invention includes a body **10**, a driving device **30**, a transmission device **50**, and a tooth breakage preventing device **60**.

Body **10** includes a driving hole **11** and a transmission hole **12** intersecting with the driving hole **11**. The driving hole **11** includes an inner periphery having a toothed portion **111** with a plurality of teeth. The transmission hole **12** has an end located in the inner periphery of the driving hole **11**. The inner periphery of the driving hole **11** includes two adjoining portions **112** located on opposite sides of the end of the transmission hole **12** and spaced from each other in a circumferential direction of the driving hole **11**. In this embodiment, the two adjoining portions **112** are symmetric to each other. An arcuate portion **113** extends between the two adjoining portions **112** and extends across the transmission hole **12** in the circumferential direction of the driving hole **11**. In this embodiment, the arcuate portion **113** extends through about 145/180π rad (about 145°). Each tooth of the toothed portion **111** has a tooth height H**1**.

The driving hole **11** is defined in an end of the body **10** and extends along a rotating axis A. The transmission hole **12** includes a first portion **121** intercommunicated with the driving hole **11** and a second portion **122** intercommunicated with the first portion **121**. The two adjoining portions **112** are on opposite sides of the first portion **121** in the circumferential direction of the driving hole **11**.

In this embodiment, the body **10** further includes a cap **13** for closing the driving hole **11** through a retaining member **131**.

The driving device **30** is rotatably received in the driving hole **11** and is adapted to drive a fastener, such as a bolt, a nut, or a socket. The driving device **30** includes a driving member **31** and two first pawls **32** pivotably mounted to the driving member **31**. Each first pawl **32** includes first and second outer toothed sections **321** and **322**. Each of the first and second outer toothed sections **321** and **322** has a plurality of teeth. The first and second outer toothed sections **321** and **322** of at least one of the first pawls **32** are selectively engaged with the toothed portion **111** of the driving hole **11**.

In this embodiment, each first pawl **32** includes an arcuate section **323** between the first and second outer toothed sections **321** and **322**.

The driving device **30** further includes two second pawls **33** pivotably mounted to the driving member **31** and two ring gears **34** rotatably received in the driving hole **11**. Each ring gear **34** includes an inner toothed portion **341** and a side toothed portion **342**. Each second pawl **33** includes two outer toothed sections **331** selectively engaged with an inner toothed portion **341** of one of the two ring gears **34**. The two ring gears **34** can rotate about the rotating axis A in the clockwise direction or the counterclockwise direction relative to the driving member **31** and are located on opposite sides of the driving member **31** along the rotating axis A. The side toothed portion **342** of each ring gear **34** engages with and can be driven by the transmission device **50**.

The driving device **30** further includes two pins **35** extending through the driving member **31**, the first pawls **32** and the second pawls **33**, such that each first pawl **32** and each second pawl **33** are pivotably mounted to the driving member **31** and are pivotable about pins **35**. In this embodiment, each first pawl **32** has a thickness along the rotating axis A not larger than a diameter of the transmission hole **12**. Preferably, the thickness of each first pawl **32** is smaller than the diameter of the transmission hole **12**.

The transmission device **50** is rotatably mounted in the transmission hole **12** and is configured to drive the driving member **31** to rotate relative to the driving hole **11** about the rotating axis A. The transmission device **50** includes a transmission shaft **51** rotatably received in the second portion **122** of the transmission hole **12**. A gear **52** is mounted on an end of the transmission shaft **51** and meshes with the side toothed portions **342** of the ring gears **34**. The transmission shaft **51** can be driven manually or driven with a power to rapidly rotate relative to the transmission hole **12**.

The tooth breakage preventing device **60** is mounted in the arcuate portion **113**. The tooth breakage preventing device **60** is configured to be in contact with one of the first and second outer toothed sections **321** and **322** of either of the two first pawls **32** to prevent tooth breakage between the toothed portion **111** of the driving hole **11** and the one of the first and second outer toothed sections **321** and **322** of either of the two first pawls **32** when the body **10** is rotated to provide a ratcheting function for driving the fastener.

The tooth breakage preventing device **60** includes at least one contact portion **61** configured to be selectively in contact with one of the first and second outer toothed sections **321** and **322** of either of the two first pawls **32**. The at least one contact portion **61** has a height H**2** extending from a circumference of a root circle of the toothed portion **111** towards the driving hole **11** in a radial direction of the root circle of the toothed portion **111**. The tooth height H**1** of the toothed portion **111** is not larger than a height H**2** of the at least one contact portion **61**.

The at least one contact portion **61** of the tooth breakage preventing device **60** has an arc length C in the circumferential direction of the driving hole **11** centered on the rotating axis A. Each tooth of each of the first and second outer toothed sections **321** and **322** has a tooth thickness S. A ratio C/S of the arc length C to the tooth thickness S is not smaller than 0.5. In this embodiment, the ratio C/S is about 1.5. By such an arrangement, when the driving member **31** rotates relative to the driving hole **11**, either of the first pawls **32** comes in contact with the at least one contact portion **61** to avoid one of the teeth of the first and second outer toothed sections **321** and **322** of either of the first pawls **32** from contacting with one of the teeth of the toothed portion **111** contiguous to a corresponding adjoining portion **112**.

In this embodiment, the height H**2** of the at least one contact portion **61** is larger than the tooth height H**1** of the toothed portion **111** of the driving hole **11**. Furthermore, the at least one contact portion **61** is a protrusion extending from the circumference of the root circle of the toothed portion **111** towards the driving hole **11** in the radial direction of the root circle of the toothed portion **111**.

In this embodiment, the tooth breakage preventing device **60** includes two contact portions **61** integrally formed with the two adjoining portions **112**, respectively. The two contact portions **61** respectively have two arcuate faces **611** selectively in contact with one of the first and second outer toothed sections **321** and **322** of either of the two first pawls **32**. The two adjoining portions **112** are located in an intersection between the driving hole **11** and the transmission hole **12** and are symmetric to each other. The two arcuate faces **611** of the two contact portions **61** are symmetric to each other.

A direction switching device **40** is operably coupled to the first pawls **32** and the second pawls **33**. The direction switching device **40** extends through the driving member **31** along the rotating axis A. The direction switching device **40** is configured to change an engagement status between the ring gears **34** and the first and second pawls **32** and **33** to change a ratcheting direction in which the fastener is driven by the driving member **31**. In this embodiment, the direction switching device **40** includes a direction switching rod **41** extending through the cap **13** and the driving member **31** and a first pressing unit **42**. The direction switching rod **41** is movable between two positions corresponding to a driving direction and a non-driving direction. The direction switching rod **41** includes a through-hole **411** extending in a direction perpendicular to the rotating axis A for receiving the first pressing unit **42**. The first pressing unit **42** includes two pressing members **421** and a biasing element **422** between the pressing members **421**. Each pressing member **421** is biased by the biasing element **422** to press against one of the first pawls **32**. The direction switching device **40** further includes a returning spring **44** attached between the direction switching rod **41** and the cap **13** for returning purposes.

The direction switching rod **41** further includes two receptacles **412** respectively receiving the two second pressing units **43**. Each second pressing unit **43** includes a pressing member **431** and a biasing element **432** for biasing the pressing member **431** to press against one of the second pawls **33**.

A user can rapidly drive transmission shaft **51** to rotate. Due to the engagement between the gear **52** and the side toothed portions **342** of the ring gears **34** and the engagement between the inner toothed portions **341** of the ring gears **34** and the outer toothed sections **331** of the second pawls **33**, the driving member **31** is driven to rotate relative to the driving hole **11**, thereby rapidly driving the fastener.

When the fastener has been tightened to an extent, in order to reach the tightness demanded by the user, the body **10** is rotated in the counterclockwise direction. Due to the engagement status between the first outer toothed sections **321** or the second outer toothed sections **322** of the first pawls **32** and the toothed portion **111** of the driving hole **11**, the driving member **31** is further rotated relative to the driving hole **11** to further drive the fastener. Then, the user can rotate body **10** in the clockwise direction, such that the first outer toothed sections **321** or the second outer toothed sections **322** of the first pawls **32** disengage from and then reengage with the toothed portion **111** of the driving hole **11**.

During repeated clockwise and counterclockwise rotations of the body **10** to provide the ratcheting function, the driving member **31** rotates relative to the driving hole **11**. When either of the first pawls **32** reaches the arcuate portion **113**, one of the contact portions **61** of the tooth breakage preventing device **60** comes into contact with the first outer toothed section **321** or the second outer toothed section **322** of the first pawl **32**. Since the height H2 is larger than the tooth height H1, either of the contact portions **61** in the form of a protrusion avoids any tooth of the first outer toothed section **321** or the second outer toothed section **322** of the first pawl **32** from contacting with one of the teeth of the toothed portion **111** contiguous to the corresponding adjoining portion **112**. This prevents tooth breakage resulting from application of a force by the user in a single-tooth engagement state before complete engagement between the toothed portion **111** of the driving hole **11** and the first outer toothed section **321** or the second outer toothed section **322**.

Furthermore, the ratio of the arc length C to the tooth thickness S is not smaller than 0.5, such that a manufacturer of the ratchet wrench with tooth breakage resistance according to the present invention can adjust the arc length C of each contact portion **61** according to the tooth thickness S. This assures either of the contact portions **61** comes into contact with either of the first pawls **32** while the driving member **31** rotates relative to the driving hole **11**, achieving the tooth breakage preventing effect.

FIG. **4** shows a ratchet wrench with tooth breakage resistance of a second embodiment according to the present invention. The second embodiment is substantially the same as the first embodiment. The second embodiment is different from the first embodiment by that the height H2 of the at least one contact portion **61** is equal to the tooth height H1 of the toothed portion **111** of the driving hole **11**. Furthermore, the at least one contact portion **61** and the two adjoining portions **112** are located in the circumferential direction of the driving hole **11**. Thus, when either of the first pawls **32** reaches the arcuate portion **113**, the tooth breakage preventing device **60** comes into contact with the first outer toothed section **321** or the second outer toothed section **322** of the first pawl **32** to provide tooth breakage resistance. Furthermore, the ratio of the arc length C to the tooth thickness S is about 0.5 (which is different from the first embodiment), such that the manufacturer of the ratchet wrench can adjust the arc length C of each contact portion **61** according to the tooth thickness S.

Although specific embodiments have been illustrated and described, numerous modifications and variations are still possible without departing from the scope of the invention. The scope of the invention is limited by the accompanying claims.

The invention claimed is:

1. A ratchet wrench comprising:

a body including a driving hole and a transmission hole intersecting with the driving hole, with the driving hole including an inner periphery having a toothed portion with a plurality of teeth, with the inner periphery of the driving hole including two adjoining portions on opposite sides of the transmission hole in a circumferential direction of the driving hole, with an arcuate portion extending between the two adjoining portions and extending across the transmission hole in the circumferential direction of the driving hole;

a driving device rotatably received in the driving hole and adapted to drive a fastener, with the driving device including a driving member and two first pawls pivotably mounted to the driving member, with each of the two first pawls including first and second outer toothed sections, with each of the first and second outer toothed sections having a plurality of teeth, with the first and second outer toothed sections of at least one of the two first pawls selectively engaged with the toothed portion of the driving hole;

a transmission device rotatably mounted in the transmission hole, with the transmission device configured to drive the driving member to rotate relative to the driving hole about a rotating axis; and

a tooth breakage preventing device provided in the arcuate portion and including two contact portions respectively integrally formed on the two adjoining portions, with the two contact portions respectively having two faces, with each of the two faces configured to be selectively in contact with one of the first and second outer toothed sections of either of the two first pawls to prevent tooth breakage between the toothed portion of the driving hole and the one of the first and second outer toothed sections of either of the two first pawls when the body is rotated to provide a ratcheting function for driving the fastener.

2. The ratchet wrench as claimed in claim **1**, with each of the two contact portions including a height extending from a circumference of a root circle of the toothed portion towards the driving hole in a radial direction of the root circle, and with each of the plurality of teeth of the toothed portion of the driving hole having a tooth height not larger than the height of each of the two contact portions.

3. The ratchet wrench as claimed in claim **2**, with the height of each of the two contact portions being larger than the tooth height of the toothed portion of the driving hole, and with each of the two contact portions being a protrusion extending from the circumference of the root circle of the toothed portion towards the driving hole in the radial direction of the root circle.

4. The ratchet wrench as claimed in claim **2**, wherein the height of each of the two contact portions is equal to the tooth height of the toothed portion of the driving hole, and wherein the two contact portions and the two adjoining portions are located in the circumferential direction of the driving hole.

5. The ratchet wrench as claimed in claim **2**, with the driving hole defined in an end of the body and extending along the rotating axis, with each of the two contact portions of the tooth breakage preventing device having an arc length in the circumferential direction of the driving hole centered on the rotating axis, with each of the two first pawls including an arcuate section between the first and second outer toothed sections, with each of the first and second outer toothed sections including a plurality of teeth, with each of the plurality of teeth of each of the first and second outer toothed sections having a tooth thickness, and with a ratio of the arc length to the tooth thickness being not smaller than 0.5.

6. The ratchet wrench as claimed in claim **2**, with the two faces being two arcuate faces.

7. The ratchet wrench as claimed in claim **6**, wherein the two adjoining portions are located in an intersection between the driving hole and the transmission hole and are symmetric to each other, and wherein the two arcuate faces of the two contact portions are symmetric to each other.

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